इंटरनेट मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”
Mazdoor Kisan Shakti Sangathan
“The Right to Information, The Right to Live”

“पुराने को छोड नये के तरफ”
Jawaharlal Nehru
“Step Out From the Old to the New”

IS 1885-4-4 (1970): Electrotechnical vocabulary, Part 4: Electron tubes, Section 4: Cathode-ray tubes [LITD 4: Electron Tubes and Display Devices]

“ज्ञान से एक नये भारत का निर्माण”
Satyanarayan Gangaram Pitroda
“Invent a New India Using Knowledge”

Act Number 22 of 2005
The Indian Parliament
RIGHT TO INFORMATION

Made Available By
Public.Resource.Org

“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”
Bhartṛhari—Nītiśatakam
“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE

BRUTUM FULMEN

IGNORANTIA
JURIS
NON EXCUSAT

PROTECTED BY COPYRIGHT

IS : 1885 (Part IV/Sec 4) - 1970
(Reaffirmed 2001)

Indian Standard
ELECTROTECHNICAL VOCABULARY
PART IV ELECTRON TUBES
Section 4 Cathode-Ray Tubes

First Reprint AUGUST 1975
(Incorporating Amendment No. 1)

UDC 621·385·832

© *Copyright* 1975

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110001

Gr . 5 *February* 1971

IS : 1885 (Part IV/Sec 4) - 1970

Indian Standard

ELECTROTECHNICAL VOCABULARY

PART IV ELECTRON TUBES

Section 4 Cathode-Ray Tubes

Electrotechnical Standards Sectional Committee, ETDC 1

Chairman	*Representing*
SHRI S. SWAYAMBU	Heavy Electricals (India) Ltd, Bhopal
Members	
ADDITIONAL CHIEF ENGINEER	Directorate General of Posts & Telegraphs (Department of Communications)
DIRECTOR OF TELEGRAPHS (I) (*Alternate*)	
DR A. S. BHADURI	National Test House, Calcutta
SHRI V. W. CHEMBURKAR	Indian Electrical Manufacturers' Association, Calcutta
SHRI R. M. NANAVATI (*Alternate*)	
SHRI K. M. CHINNAPPA	Relays Sectional Committee, ETDC 35, ISI
SHRI K. A. DAVE	Central Water & Power Commission (Power Wing)
SHRI S. N. VINZE (*Alternate*)	
SHRI P. N. DEOBHAKTA	Electrical Wiring Accessories Sectional Committee ETDC 44, ISI
DIRECTOR	Electronics and Radar Development Establishment (Ministry of Defence), Bangalore
SHRI V. M. GOOTE	Department of Communications (Wireless Planning and Coordination Wing)
SHRI K. MATTHAN	Conductors and Cables Sectional Committee, ETDC 32, ISI
SHRI S. S. MURTHY	Institution of Engineers (India), Calcutta
PROF R. C. NARAYANAN	General Nomenclature and Symbols Subcommittee, ETDC 1 : 3, ISI
SHRI U. K. PATWARDHAN	Transformers Sectional Committee, ETDC 16, ISI
SHRI R. RADHAKRISHNAN	Central Electro-chemical Research Institute (CSIR), Karaikudi
SHRI H. N. VENKOBARAO (*Alternate*)	
SHRI K. RAMANATHAN	Heavy Electricals (India) Ltd, Bhopal
SHRI S. K. BHATIA (*Alternate*)	
SHRI A. P. SEETHAPATHY	Switchgear and Controlgear Sectional Committee, ETDC 17, ISI; *and* Power Frequency and Voltages Subcommittee, ETDC 1 : 1, ISI
SHRI R. K. TANDAN	National Physical Laboratory (CSIR), New Delhi

(*Continued on page* 2)

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110001

(*Continued from page* 1)

Members	*Representing*
Shri S. Thiruvenkatachari	Electronic Equipment Sectional Committee, ETDC 24, ISI
Dr H. V. K. Udupa	Secondary Cells and Batteries Sectional Committee, ETDC 11, ISI
Dr B. H. Wadia	Semiconductor Devices Sectional Committee, ETDC 40, ISI
Shri J. S. Zaveri	Rotating Machinery Sectional Committee, ETDC 15, ISI
Shri Y. S. Venkateswaran, Director (Elec tech) (*Secretary*)	Director General, ISI (*Ex-officio Member*)

Electron Tubes Sectional Committee, ETDC 39

Chairman	
Shri C. R. Subramanian	Bharat Electronics Ltd, Bangalore
Members	
Dr S. S. S. Agarwala	Central Electronics Engineering Research Institute (CSIR), Pilani
Dr R. P. Wadhva (*Alternate*)	
Shri P. N. Deobhakta	Directorate General of Technical Development (Ministry of Industrial Development & Company Affairs)
Shri Balraj Bhanot (*Alternate*)	
Director, Electrical Engineering	Naval Headquarters
Director, Electronics & Radar Development Establishment	Directorate General of Research & Development (Ministry of Defence)
Dr R. R. Dutta Gupta	Directorate General of Inspection (Ministry of Defence)
Shri R. S. Yadav (*Alternate*)	
Shri B. P. Ghosh	National Test House, Calcutta
Shri R. K. Jain	Radio Electronic & Television Manufacturers Association (RETMA), Calcutta
Shri S. Y. Phatak (*Alternate*)	
Shri S. C. Majumdar	Directorate General of Civil Aviation (Ministry of Tourism & Civil Aviation)
Shri J. S. Monga	All India Radio Merchants' Association, Bombay
Shri V. J. Bhatt (*Alternate*) (Bombay)	
Shri D. N. Chaudhuri (*Alternate*) (Calcutta)	
Shri L. S. V. Easwar (*Alternate*) (Madras)	
Prof S. Sampath	In personal capacity (*Indian Institute of Technology, Madras*)
Shri S. N. Sen	All India Radio, New Delhi

(*Continued on page* 17)

Indian Standard

ELECTROTECHNICAL VOCABULARY

PART IV ELECTRON TUBES

Section 4 Cathode-Ray Tubes

0. FOREWORD

0.1 This Indian Standard (Part IV/Section 4) was adopted by the Indian Standards Institution on 25 August 1970, after the draft finalized by the Electrotechnical Standards Sectional Committee in consultation with the Electron Tubes Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This standard deals with terms and definitions applicable to cathode-ray tubes such as oscilloscope tubes, radar display tubes, picture tubes, etc.

0.3 This standard is one of a series of Indian Standards on electrotechnical vocabulary on electron tubes. A list of standards so far published in this series is given on Page 18.

1. SCOPE

1.1 This standard (Part IV/Section 4) covers definitions of terms relating to cathode-ray tubes (oscilloscope, display and picture tubes).

2. TYPES OF CATHODE-RAY TUBES

2.1 Cathode-Ray Tube — An electron-beam tube in which the beam can be focused to a desired cross section on a surface and varied in position and intensity to produce a pattern either visible or otherwise detectable.

2.2 Long Persistence Cathode-Ray Tube — A cathode-ray tube having a long-persistence screen.

2.3 Short Persistence Cathode-Ray Tube — A cathode-ray tube having a short persistence screen.

2.4 Medium Persistence Cathode-Ray Tube — A cathode-ray tube having a medium persistence screen.

2.5 Dark Trace Tube — A form of cathode-ray tube in which the screen is designed to possess the property of darkening under the impact of an electron beam.

NOTE — The persistence of the trace depends on the temperature of the screen and can be modified by irradiation with light of suitable wavelengths.

2.6 Double Trace Cathode-Ray Tube Split-Beam Cathode-Ray Tube — A cathode-ray tube containing one electron gun producing a beam which is split to produce two traces on the screen.

2.7 Double-Gun Cathode-Ray Tube — A cathode-ray tube containing two independent electron gun systems.

2.8 Multiple-Gun Cathode-Ray Tube — A cathode-ray tube containing more than two independent electron gun systems.

2.9 Picture Tube/Television Tube — A cathode-ray tube specifically designed for the reproduction of television images.

2.10 Black-and-White Picture Tube — A picture tube capable of producing an image, that reproduces only the luminances of the object.

2.11 Colour Picture Tube — A picture tube capable of producing an image that reproduces both the luminances and the colours of the object.

2.12 Projection Tube — A cathode-ray tube specifically designed for use with an optical system to produce a magnified image of a picture or trace on an external screen.

2.13 Oscilloscope Tube — A cathode-ray tube used to produce a visible pattern, which is the graphical representation of the relation between electric signals.

2.14 Flying-Spot Scanner Tube — A cathode-ray tube designed for the generation of a point light source which is moved to scan a physical object such as a transparency.

2.15 Tuning Indicator/Electron-Ray Indicator — A cathode-ray tube employing a controlled beam of electrons for indicating visually the comparative magnitude of a direct or alternating voltage by means of the area of luminescence produced on an enclosed luminescent screen.

3. COMPONENT PARTS

3.1 Envelope/Bulb — That part of an electron device which forms the gas-tight enclosure.

3.2 Neck — The narrow tubular part of the envelope near the base, which usually contains the electron gun.

3.3 Cone — That part of the envelope, usually in the form of a truncated cone, which lies between the neck and the face-plate.

3.4 Face-Plate — A glass plate carrying the luminescent screen and attached to the cone.

3.5 Face — The transparent end of the cone through which the image is viewed or projected.

3.6 Electron Gun — A structure comprising a cathode and one or more electrodes for producing a directed electron beam.

3.7 Ion Trap — A device intended to remove negative ions from the electron beam.

3.8 Splitting Electrode — An electrode whose primary function is to split an electron beam into two beams.

3.9 Accelerator — An electrode whose voltage provides the electric field to increase the velocity of the electrons in a beam.

3.10 Post-Deflection Accelerator — An electrode that accelerates the electrons in the beam after deflection.

3.11 Modulator — A component electrode of the gun whose primary purpose is to control the magnitude of the electron beam current.

3.12 Electron Lens — An electrode system to produce electrostatic and/or magnetic fields capable of controlling the divergence or convergence of an electron beam.

3.12.1 *Electromagnetic Lens* — An electron lens in which the control is effected by magnetic field.

3.12.2 *Electrostatic Lens* — An electron lens in which the control is effected by electrostatic field.

3.13 Focusing Electrode — An electrode designed to produce electrostatic field for focusing of an electron beam.

3.14 Focusing Magnet — A permanent magnet or electromagnet used to produce magnetic field for focusing an electron beam.

3.15 Focusing Coil — A coil used to produce magnetic field for focusing an electron beam.

3.16 Deflectors/Deflector Plates — The electrodes used to produce electrostatic field for deflection of an electron beam.

3.17 Deflector Coil — A coil, usually mounted externally to the neck of the tube, used to produce magnetic field for deflection of an electron beam.

3.18 Deflection Yoke/Yoke Assembly — An external structure that provides magnetic fields required for alignment focusing and scanning.

3.19 Screen/Luminescent Screen — A layer, on the inside of a cathode-ray tube, in which the luminescence is produced.

3.20 Metallized Screen — A screen covered with a metallic film (usually of aluminium) on the side nearer the electron gun.

NOTE — This film, while allowing electrons to penetrate, offers a barrier to negative ions and also increases the luminance of the screen.

3.21 Long Persistence Screen — A screen specially prepared to retain its luminance for an appreciable time after the stimulus has been reduced or removed.

3.22 Short Persistence Screen — A screen whose luminance decays rapidly after the stimulus has been reduced or removed.

3.23 Medium Persistence Screen — Under consideration.

3.24 Cascade Screen/Multilayer Screen — A screen in which more than one separate phosphor layers are employed.

3.25 Double Layer Screen — A screen in which two separate phosphor layers are employed to achieve (for example) long persistence.

3.26 Dark Trace Screen — A screen which changes colour but does not necessarily luminesce under electron impact showing, for example, a dark trace on a bright background.

4. GUN CHARACTERISTICS

4.1 Electron Beam — A beam of electrons moving in paths that are confined to a desired region.

4.2 Modulation Voltage — The value of steady voltage applied to the modulator to produc a specified intensity of light or other radiation from the screen.

4.3 Cut-Off Voltage — The value of the negative going modulation voltage required to reduce the luminescence on the screen to a negligible value under specified operating conditions.

4.4 Cathode Drive Voltage — The difference between the cut-off voltage and the modulation voltage.

4.5 Beam Current — The electron current of the beam impinging upon the screen of a cathode-ray tube.

4.6 Grid-Cathode Driving Voltage — The value of the alternating or pulse voltage which shall be applied between the grid and the cathode to increase the beam current or spot luminance from the cut-off value to a stated value.

4.7 Gun Efficiency — The ratio between the beam current and the cathode current.

4.8 Flashover — An uncontrolled electrical discharge between any two or more tube electrodes.

5. FOCUSING CHARACTERISTICS

5.1 Cross-Over Point — The first point of convergence of the beam in an electron gun.

5.2 Beam Angle — The solid angle of the cone-shaped beam of electrons emerging from the cross-over point.

5.3 Focusing of an Electron Beam — The process of concentrating the cross section of an electron beam so that the beam converges at a desired point.

NOTE — In cathode-ray tube, convergence to a desired point is important for well defined focus and trace. In microwave tubes maintaining uniform cross section without divergence is the criterion of focusing.

5.4 Electrostatic Focusing — Focusing of an electron beam by the action of an electrostatic field.

5.5 Magnetic Focusing/Magnetic Field Focusing — Focusing of an electron beam by the action of a magnetic field.

5.6 Astigmatism — A focus defect in which electrons in different axial planes focus at different axial distances from the lens.

5.7 Chromatic Aberration — An enlargement of the focused spot caused by the velocity distribution of electrons throughout the beam.

5.8 Spherical Aberration — A focus defect in which electrons at different radial distances from the axis focus at different axial distances from the lens.

5.9 Gas Content Coefficient — The ratio between the ion current and the electron current which causes it.

6. DEFLECTION CHARACTERISTICS

6.1 Deflection — Displacement of a beam by an electrostatic or magnetic field.

6.1.1 *Electrostatic Deflection* — Deflection by an electrostatic field.

6.1.2 *Magnetic Deflection* — Deflection by a magnetic field.

6.1.3 *Symmetrical Deflection* — Deflection produced by the application to a pair of deflectors of a voltage such that at everyinstant the voltage between one plate and the final accelerator is numerically equal but opposite in sign to that of the other plate.

6.1.4 *Asymmetrical Deflection* — The deflection produced by the application to a pair of deflector plates of a voltage such that one of the plates is maintained at a fixed voltage (usually zero) with respect to the final accelerator.

6.2 Deflection Current — The current in a deflector coil.

6.3 Deflection Voltage — The voltage applied to the deflection plates.

6.4 Deflection Sensitivity (Electrostatic) — The ratio between the spot displacement and the change in voltage between the deflector plates, for a stated voltage on the final accelerator.

NOTE — The sensitivity is usually expressed in millimetres of spot deflection per volt applied between the deflector plates.

6.5 Deflection Sensitivity (Magnetic) — The ratio between the spot displacement and the change in deflecting coil current for a given magnetic deflecting system and for a stated voltage on the final accelerator.

6.6 Electrical Deflection Factor/Deflection Coefficient — Reciprocal of electrostatic deflection sensitivity.

6.7 Electrical Deflection Uniformity Factor — The factor expressing the uniformity in electrostatic deflection sensitivity over the scan length.

6.8 Deflection Defocusing — An enlargement (usually non-uniform) of the spot caused by change of focus of the beam when deflected.

6.9 Pattern Distortion — Any deformation of the pattern from its intended form.

6.10 Trapezium Distortion — A pattern distortion that causes a symmetrically disposed rectangle to take the form of a trapezium.

6.11 Barrel Distortion — A pattern distortion that causes convex sides to appear on a symmetrically disposed rectangle.

6.12 Pin-Cushion Distortion — A pattern distortion that causes concave sides to appear on a symmetrically disposed rectangle.

6.13 S-Distortion — A pattern distortion that causes a straight line to take the form of letter S.

6.14 Neck Shadow — A shadow on the screen caused by interception of the beam by the neck of the tube.

6.15 Coma — A comet-like appearance of the undeflected spot caused by the lack of alignment between the source of the beam and the electron lens system.

7. POST DEFLECTION ACCELERATION CHARACTERISTICS

7.1 Post Deflection Acceleration — Application of accelerating fields between the deflecting system and the screen.

7.2 Post Deflection Acceleration Ratio — The ratio between the screen potential and the potential of the last acceleration electrode preceding the deflecting system.

7.3 Post Deflection Acceleration Factor — The ratio between sensitivity in the presence of post deflection acceleration and that without post deflection acceleration (PDA).

8. SCREEN CHARACTERISTICS

8.1 Screen Characteristics — Those characteristics which describe the luminescent or electrical properties of the screen under specified operating conditions of the cathode-ray tube.

8.2 Spectral Characteristics — The relation between the wavelength of light or other radiation emitted from the screen and the energy radiated at that wavelength, that is the spectral distribution.

8.3 Screen Efficiency — The ratio between the light or other radiation intensity of an excited area on the screen and the product of beam current and final accelerator voltage.

8.4 Sticking Voltage/Sticking Potential — The voltage of a non-metallized screen, relative to the cathode, above which the secondary emission factor of the screen material would be less than unity.

8.5 Secondary Emission — Uncontrolled emission that causes undesirable luminescence on the screen under cut-off conditions.

8.6 Secondary Emission Factor — The ratio of the number of secondary electrons emitted by the screen to the number of primary electrons incident on it.

8.7 Screen Centre Focusing Voltage — That voltage on the focusing electrode of the tube that gives the best focus of a defined pattern at the centre of the screen at the specified operating conditions.

8.8 Persistence — The decaying luminescence of the screen after the stimulus has been reduced or removed.

8.9 Persistence Characteristics — The relation between the intensity of light or other radiation obtained from the screen and the time elapsing after the removal of the stimulus.

8.10 Luminance

8.10.1 *Build-Up of Luminance* — The increase in luminance with time from the initiation of excitation to the point where equilibrium occurs or excitation ceases.

8.10.2 *Time of Persistence* — The time which elapses between the instant of removal of the stimulus to the instant at which the luminance has dropped to a predetermined fraction of the initial intensity.

8.11 Useful Screen Dimensions — The dimensions of the luminescent part of the screen visible when viewing in the direction of the tube axis within which useful observations or measurements may be made.

8.12 Large Area Contrast — The ratio between luminance at two widely separated areas on the screen with the screen excited by the electron beam, and a particular luminance level in one of the two areas, and with the beam biased off in the other area.

8.13 Detail Contrast — The ratio between the values of luminance of adjacent picture elements.

NOTE — This is intimately associated with resolution.

8.14 Trace/Line/Scan — The visible or recordable path traced on the screen by the moving spot.

8.14.1 *Available Line* — The portion of the scanning line which can be used specifically for picture signals.

8.14.2 *Fly-Back Line/Back Line/Retrace Line* — The line traced by the electron beam in going from the end of one line or field to the start of the next line or field.

8.15 Raster — A predetermined pattern of scanning lines which provides a substantially uniform coverage of an area.

8.16 Maximum Scan — The maximum length of a line scanned on each axis.

NOTE — For tubes with post deflection acceleration, the maximum scan will be different depending on whether post deflection acceleration voltages are applied or not.

8.17 Screen Burn

a) The presence of an area of reduced luminance resulting from the deterioration of the active material on the screen by electron or ion impacts.

b) The area itself.

8.18 Halation — The presence of an illuminated annular area surrounding the spot, caused by reflection of light from the front and rear surface of the face plate.

8.19 Microphony of a Cathode-Ray Tube — Movement or modulation of the spot on the screen caused by mechanical vibration affecting the tube.

8.20 Writing Speed, Maximum — The maximum speed at which the spot can travel on the screen without significant deterioration in intensity or shape.

8.21 Resolution — The indication characterising the finest detail which can be recognized on the picture by a given system.

NOTE — The resolution can be expressed by the inverse of the linear dimension of the smallest detail and measured by the maximum total number of alternate dark and bright lines per unit length.

8.22 Line-Width — The apparent width of a line when viewed through a slit which is scanned across it. This width corresponds to the distance between lines bounded by a specified percent (for example 20 percent) of peak luminance.

9. SPOT CHARACTERISTICS

9.1 Spot — That small luminescent area of the screen surface instantaneously stimulated by the impact of the electron beam.

9.2 Spot Size — The effective size of the spot.

9.3 Spot Diameter — The apparent diameter of the spot when viewed through a slit which is scanned across it. This diameter corresponds to the distance between lines bounded by specified 20 percent, for example, of peak luminance (*see* Fig. 1).

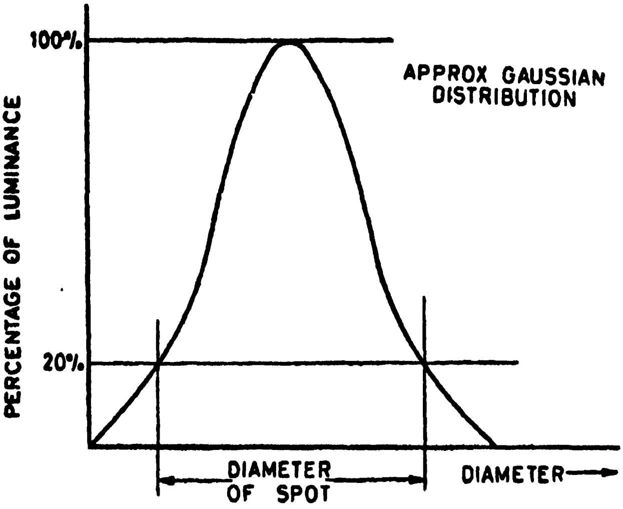

Fig. 1 Luminance Distribution

9.4 Mechanical Spot Displacement — Displacement of the spot with respect to a stated reference point on the screen, with all the deflecting plates connected directly to the final accelerator.

9.5 Electrical Spot Displacement — Displacement due to an effect of self-bias caused by a leakage current or a beam current passing through a resistor put in the circuit of a deflector plate.

9.6 Spot Distortion — Undesirable asymmetry or defect in the spot shape, which may be due to astigmatism, spherical aberration or coma.

10. MULTI-BEAM CATHODE-RAY TUBES

10.1 Convergence of Multiple Beams — The state in which two or more electron beams intersect.

10.2 Dynamic Convergence of Multiple Beams — The convergence of electron beams on a specified surface during the scanning process.

10.3 Convergence Surface — The surface generated by the point of intersection of the electron beams during the scanning process.

10.4 Covergence Electrode — An electrode whose electrostatic field converges the electron beams.

10.5 Convergence Magnet — A magnet assembly whose magnetic field converges the electron beams.

10.6 Positional Cross-Talk — A change in the path followed by one electron beam, caused by a change in another beam.

INDEX

NOTE — This index has been prepared in accordance with IS : 1275-1958*. Index numbers are clause numbers.

A

Aberration
  Chromatic 5.7
  Spherical 5.8
Acceleration
  factor, Post deflection 7.3
  Post deflection 7.1
  ratio, Post deflection 7.2
Accelerator 3.9
  Post deflection 3.10
Angle, Beam 5.2
Area contrast, Large 8.12
Assembly, Yoke 3.18
Astigmatism 5.6
Asymmetrical deflection 6.1.4
Available line 8.14.1

B

Back line 8.14.2
Barrel distortion 6.11
Beam
  angle 5.2
  Convergence of multiple 10.1
  current 4.5
  Dynamic convergence of multiple 10.2
  Electron 4.1
  Focusing of an electron 5.3
Black-and-white picture tube 2.10
Build up of luminance 8.10.1
Bulb 3.1
Burn, Screen 8.17

C

Cascade screen 3.24
Cathode drive voltage 4.4
Cathode-ray tube 2.1
  Double-gun 2.7
  Double trace 2.6
  Long persistence 2.2
  Medium persistence 2.4
  Microphony of a 8.19
  Multiple gun 2.8
  Short persistence 2.3
  Split beam 2.6
Centre focusing voltage, Screen 8.7
Characteristic
  Persistence 8.9
  Screen 8.1
  Spectral 8.2
Chromatic aberration 5.7
Coefficient
  Deflection 6.6
  Gas content 5.9
Coil
  Deflector 3.17
  Focusing 3.15
Colour picture tube 2.11
Coma 6.15
Cone 3.3
Contrast
  Detail 8.13
  Large area 8.12
Convergence
  electrode 10.4
  magnet 10.5
  of multiple beams 10.1
    Dynamic 10.2
  surface 10.3
Cross-over point 5.1
Cross-talk, Positional 10.6
Current
  Beam 4.5
  Deflection 6.2
Cut-off voltage 4.3

D

Dark trace
  screen 3.26
  tube 2.5
Deflection 6.1
  acceleration
    factor, Post 7.3
    Post 7.1
    ratio, Post 7.2
accelerator, Post 3.10
Asymmetrical 6.1.4
coefficient 6.6
current 6.2
defocusing 6.8
Electrostatic 6.1.1
factor, Electrical 6.6
Magnetic 6.1.2
sensitivity
  (electrostatic) 6.4
  (magnetic) 6.5
Symmetrical 6.1.3
uniformity factor, Electrical 6.7
voltage 6.3
yoke 3.18

---

*Rules for making alphabetical indexes.

- Deflector
  - coil 3.17
  - plates 3.16
- Deflectors 3.16
- Defocusing, Deflectors 6.8
- Detail contrast 8.13
- Diameter 9.3
- Dimensions, Useful screen 8.11
- Displacement
  - Electrical spot 9.5
  - Mechanical spot 9.4
- Distortion
  - Barrel 6.11
  - Pattern 6.9
  - Pin-cushion 6.12
  - Spot 9.6
  - Trapezium 6.10
- Double-gun cathode-ray tube 2.7
- Double-layer screen 3.25
- Double-trace cathode-ray tube 2.6
- Drive voltage, Cathode 4.4
- Driving voltage, Grid, cathode 4.6
- Dynamic convergence of multiple beams 10.2

E

- Efficiency
  - Gun 4.7
  - Screen 8.3
- Electrical
  - deflection
    - factor 6.6
    - uniformity factor 6.7
  - spot displacement 9.5
- Electrode
  - Convergence 10.4
  - Focusing 3.13
  - Splitting 3.8
- Electromagnetic lens 3.12.1
- Electron
  - beam 4.1
    - Focusing of an 5.3
  - gun 3.6
  - lens 3.12
- Electron-ray indicator 2.15
- Electrostatic
  - deflection 6.1.1
    - sensitivity 6.4
  - focusing 5.4
  - lens 3.12.2
- Emission
  - factor, Secondary 8.6
- Secondary 8.5
- Envelope 3.1

F

- Face 3.5
  - plate 3.4
- Factor
  - Electrical deflection 6.6
    - uniformity 6.7
  - Post deflection acceleration 7.3
  - Secondary emission 8.6
- Field focusing, Magnetic 5.5
- Flashover 4.8
- Fly-back line 8.14.2
- Flying-spot scanner tube 2.14
- Focusing
  - coil 3.15
  - electrode 3.13
  - Electrostatic 5.4
  - magnet 3.14
  - Magnetic 5.5
    - field 5.5
  - of an electron beam 5.3
  - voltage, Screen centre 8.7

G

- Gas content coefficient 5.9
- Grid-cathode driving voltage 4.6
- Gun
  - efficiency 4.7
  - Electron 3.6

H

- Halation 8.18

I

- Indicator
  - Electron-ray 2.15
  - Tuning 2.15
- Ion trap 3.7

L

- Large area contrast 8.12
- Lens
  - Electromagnetic 3.12.1
  - Electron 3.12
  - Electrostatic 3.12.2
- Line 8.14
  - Available 8.14.1
  - Back 8.14.2
  - Fly-back 8.14.2
  - Retrace 8.14.2
- Line-width 8.22

Long persistence
  cathode-ray tube 2.2
  screen 3.21
Luminance, Build-up of 8.10.1
Luminescent screen 3.19

M

Magnet
  Convergence 10.5
  Focusing 3.14
Magnetic
  deflection 6.1.2
    sensitivity 6.5
  field focusing 5.5
  focusing 5.5
Maximum
  scan 8.16
  writing speed 8.20
Mechanical spot displacement 9.4
Medium persistence
  cathode-ray tube 2.4
  screen 3.23
Metallized screen 3.20
Microphony of a cathode-ray tube 8.19
Modulation voltage 4.2
Modulator 3.11
Multilayer screen 3.24
Multiple beams
  Convergence of 10.1
  Dynamic convergence of 10.2
Multiple-gun cathode-ray tube 2.8

N

Neck 3.2
  shadow 6.14

O

Oscilloscope tube 2.13

P

Pattern distortion 6.9
Persistence 8.8
  characteristic 8.9
  screen
    Long 3.21
    Medium 3.23
    Short 3.22
  Time of 8.10.2
Picture
  tube 2.9
    Black-and-white 2.10
    Colour 2.11
Pin-cushion distortion 6.12
Plates, Deflector 3.16
Point, Cross-over 5.1
Positional cross-talk 10.6
Post deflection
  acceleration 7.1
    factor 7.3
    ratio 7.2
  accelerator 3.10
Potential, Sticking 8.4
Projection tube 2.12

R

Raster 8.15
Resolution 8.21
Retrace line 8.14.2

S

Scan 8.14
  Maximum 8.16
Scanner tube, Flying spot 2.14
Screen 3.19
  burn 8.17
  Cascade 3.24
  centre focusing voltage 8.7
  characteristics 8.1
  Dark trace 3.26
  dimensions, Useful 8.11
  Double-layer 3.25
  efficiency 8.3
  Long persistence 3.21
  Luminescent 3.19
  Medium persistence 3.23
  Metallized 3.20
  Multilayer 3.24
  Short persistence 3.22
S-distortion 6.13
Secondary
  emission 8.5
    factor 8.6
Sensitivity
  (electrostatic), Deflection 6.4
  (magnetic), Deflection 6.5
Shadow, Neck 6.14
Short persistence
  cathode-ray tube 2.3
  screen 3.22
Size, Spot 9.2
Spectral characteristic 8.2
Speed, maximum, Writing 8.20
Spherical aberration 5.8
Split-beam cathode-ray tube 2.6
Splitting electrode 3.8

Spot 9.1
  diameter 9.3
  displacement
    Electrical 9.5
    Mechanical 9.4
  distortion 9.6
  size 9.2
Sticking
  potential 8.4
  Voltage 8.4
Surface, Convergence 10.3
Symmetrical deflection 6.1.3

T

Television tube 2.9
Time of persistence 8.10.2
Trace 8.14
  screen, Dark 3.26
  tube, Dark 2.5
Trap, Ion 3.7
Trapezium distortion 6.10
Tube
  Cathode-ray 2.1
    Double-gun 2.7
    Double trace 2.6
    Long persistence 2.2
    Medium persistence 2.4
    Microphony of a 8.19
    Multiple-gun 2.8
    Short persistence 2.3
    Split-beam 2.6

Tube — *Contd*
  Dark trace 2.5
  Flying-spot scanner 2.14
  Oscilloscope 2.13
  Picture 2.9
    Black-and-white 2.10
    Colour 2.11
  Projection 2.12
  Television 2.9
Tuning indicator 2.15

U

Uniformity factor, Electrical deflection 6.7
Useful screen dimensions 8.11

V

Voltage
  Cathode drive 4.4
  Cut-off 4.3
  Deflection 6.3
  Grid-cathode driving 4.6
  Modulation 4.2

W

Writing speed, maximum 8.20

Y

Yoke
  assembly 3.18
  Deflection 3.18

(*Continued from page* 2)

Members	*Representing*
Shri K. T. Shastry	Directorate of Technical Development & Production (Air) (Ministry of Defence)
Shri P. M. Shankar Rao (*Alternate*)	
Shri K. S. Sree Prakash	Bharat Electronics Ltd, Bangalore
Shri A. V. Ramachandra Rao (*Alternate*)	
Shri G. H. Vaze	Bhabha Atomic Research Centre, Bombay
Shri Y. S. Venkateswaran, Director (Elec tech)	Director General, ISI (*Ex-officio Member*)

Secretary

Shri N. Srinivasan
Deputy Director (Elec tech), ISI

Panel for Cathode-Ray Tubes, ETDC 39 : P4

Convener	
Prof S. Sampath	In personal capacity (*Indian Institute of Technology, Madras*)
Members	
Shri C. Ambasankaran	Bhabha Atomic Research Centre, Bombay
Shri G. K. Bhide (*Alternate*)	
Shri A. V. Ramachandra Rao	Bharat Electronics Ltd, Bangalore
Dr N. C. Vaidya	Central Electronics Engineering Research Institute (CSIR), Pilani

INDIAN STANDARDS
ON
ELECTRON TUBES

IS:

- 1885 Electrotechnical vocabulary:
  - (Part IV/Sec 1)-1973 Part IV Electron tubes, Section 1 Common terms (*first revision*)
  - (Part IV/Sec 2)-1973 Part IV Election tubes, Section 2 X-ray tubes (*first revision*)
  - (Part IV/Sec 3)-1970 Part IV Electron tubes, Section 3 Microwave tubes
  - (Part IV/Sec 4)-1970 Part IV Electron tubes, Section 4 Cathode-ray tubes
  - (Part IV/Sec 5)-1972 Part IV Electron tubes, Section 5 Pulse terms
  - (Part IV/Sec 6)-1972 Part IV Electron tubes, Section 6 Noise in microwave tubes
  - (Part IV/Sec 7)-1973 Part IV Electron tubes, Section 7 Camera tubes
  - (Part IV/Sec 8)-1973 Part IV Electron tubes, Section 8 Photosensitive devices
- 2032 Graphical symbols used in electrotechnology:
  - (Part IX)-1969 Electron tubes (other than microwave tubes)
  - (Part XIII)-1971 Microwave tubes
- 2597 Code of practice for the use of electron tubes:
  - (Part I)-1964 Commercial receiving tubes
  - (Part II)-1967 Special quality receiving tubes
  - (Part III)-1969 Transmitting and industrial tubes
  - (Part IV)-1970 Cathode-ray tubes
  - (Part V)-1971 Rectifiers and thyratrons
- 2612-1965 Recommendation for type approval and sampling procedures for electronic components
- 2684 Dimensions of electron tubes:
  - (Part I)-1972 Miniature '9-pin noval' type (*first revision*)
  - (Part II)-1972 Miniature '7-pin type' (*first revision*)
  - (Part III)-1971 Octal base type
  - (Part IV)-1971 Magnoval base type
  - (Part V)-1972 Loctal base type
- 3154-1965 Specification for X-ray tubes, diagnostic type
- 4096-1973 Method of measurement of optical focal spot size of X-ray tubes (*first revision*)
- 4147-1967 Method of measurements on conventional receiving electron tubes
- 4579-1968 Method of measurements on television picture tubes
- 4697-1968 Method of measurements on Geiger Muller counter tubes
- 5923-1969 Letter symbols and abbreviations for electron tubes
- 5627-1970 Methods of measurements on cathode-ray display tubes
- 5840 Dimensions of cathode-ray tubes:
  - (Part I)-1970 Tube outlines
  - (Part II)-1970 Bases
  - (Part III)-1970 EHT terminals
- 6134 Methods of measurement on microwave tubes:
  - (Part I/Sec 1)-1971 General measurements, Section 1 General conditions and precaution for measurements
  - (Part I/Sec 2)-1972 General measurements, Section 2 Common to all devices
  - (Part II)-1973 Oscilator tubes
  - (Part III)-1973 Amplifier tubes
- 6136-1971 Basic requirements for cathode-ray tubes
- 6214-1971 Phosphors for cathode-ray tube
- 6567-1972 Radiation protection for an X-ray tube in a protective tube-housing, operating between 10 kV and 400 kV
- 6568-1972 Implosion protection for TV picture tubes
- 6576-1972 Methods of measurements on gas filled cold cathode indicator tubes
- 6577-1972 Methods of measurements on gas filled cold cathode voltage stabilizing and voltage reference tubes
- 6757-1972 Dimensions for high tension cable terminations for X-ray tubes
- 6758-1972 Dimensions for high tension receptacles for X-ray tubes
- 7012-1973 Specification for X-ray tube shield

PUBLICATIONS OF INDIAN STANDARDS INSTITUTION

INDIAN STANDARDS

Over 8 000 Indian Standards covering various subjects have been issued so far. Of these, the standards belonging to the Electrotechnical Group fall under the following categories:

- Acoustics and acoustical measurement
- Automobile electrical equipment
- Batteries
- Cinematographic equipment
- Conductors and cables
- Domestic electrical appliances
- Electric welding equipment
- Electrical installations, codes of practice
- Electrical instruments
- Electron tubes and valves
- Electronic components
- Electronic equipment
- Environmental testing procedures
- Fans
- Flameproof electrical equipment
- High voltage techniques
- Illuminating engineering
- Instrument transformers
- Insulating materials
- Insulators and accessories
- Integrating meters
- Lamps and lamp accessories
- Lifts and escalators
- Lightning arresters
- Motors and generators
- Nomenclature and symbols
- Power capacitors
- Power converters
- Relays
- Rotating machinery
- Semiconductor devices
- Switchgear and controlgear
- Transformers and reactors
- Winding wires
- Wiring accessories
- Unclassified

OTHER PUBLICATIONS

ISI Bulletin (Published Every month)	
Single Copy	Rs 4·00
Annual Subscription	Rs 36·00
Standards : Monthly Additions	
Single Copy	Re 0·30
Annual Subscription	Rs 3·00
Annual Reports (from 1948-49 Onwards)	Rs 2·00 to 6·00
ISI Handbook, 1975	Rs 30·00

INDIAN STANDARDS INSTITUTION

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110001

Telephone : 27 01 31 (20 lines) **Telegrams : Manaksanstha**

Regional Offices:

			Telephone
Western :	Novelty Chambers, Grant Road	BOMBAY 400007	37 97 29
Eastern :	5 Chowringhee Approach	CALCUTTA 700072	23-08 02
Southern :	54 General Patters Road	MADRAS 600002	8 37 81

Branch Offices:

'Pushpak', Nurmohamed Shaikh Marg, Khanpur	AHMEDABAD 380001	2 03 91
'F' Block, Unity Bldg, Narasimharaja Square	BANGALORE 560002	2 76 49
Kothi No. 90, Sector 18A	CHANDIGARH	2 83 20
5-8-56/57 Nampally Station Road	HYDERABAD 500001	4 57 11
117/418 B Sarvodaya Nagar	KANPUR 208005	82 72
B.C.I. Bldg (Third Floor), Gandhi Maidan East	PATNA 800004	2 56 55

Printed at Neelkamal Printers, Delhi, India